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THE BAROMETER is a student bi-weekly newspaper for the exchange of ideas and information concerning the development and improvement of the professional environment at the Naval Postgraduate School. Items of interest, papers, and articles of interest to the students, staff, and faculty as a whole are solicited.

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"People are our most important asset, and the key to our readiness posture. Their proper utilization through intelligent use of shipboard automation, sytems integration and good design which eliminate unnecessary tasks and equipments is our greatest challenge in today's Navy under the AVF. We must keep this challenge foremost in our minds as we attack the problems of today and design the ships of tomorrow." Vice Admiral Walter D. Gaddis, USN Deputy Chief of Naval Operations

EDITORIAL COMMENT: The feature article for this week comes from the June 1974 issue of the Naval Engineers Journal. It is the luncheon address delivered by Vice Admiral Walter D. Gaddis, USN who is Deputy Chief of Naval Operations (Logistics).

FEATURE: PEOPLE - OUR MOST IMPORTANT ASSET.

"People are our most important asset. People are the key with which we energize this great machine called the United States Navy. Without them, ships cannot sail; aircraft cannot fly. And today, with higher costs for everything, and an All Volunteer Force, the proper utilization of our precious manpower is more important than ever before.

I would like to discuss with you some of the aspects of this problem that we are striving to improve, and to point out some ways in which you gentlemen can help.

We are well along in the shift from a wartime to a peacetime Navy. The single most significant aspect of this process is the conversion of the Navy to an All Volunteer Force (AVF). Throughout the rest of our discussion I would ask you to focus your attention on the AVF and the impact it will have upon the supply of skilled personnel to man the Navy in the future.

No longer can we afford a personnel manpower system which is driven by a machine-centered demand to fill more and more billets calling for highly specialized skills. There must be a fundamental change in the system's philosophy that recognizes the supply of skilled people will be limited. For the past three years, the Navy has been required to make significant reductions in the levels of total manpower in order to meet limits imposed by the Congress and the Department of Defense. A couple of little known statistics might emphasize the point.

FIRST, a base force of 500,000 has been selected for planning purposes because that is the force level set forth by law (10 U.S. Code 5401) as the maximum force in a non-emergency environment.

SECOND, projections developed by the Bureau of Labor Statistics in July 1973 predict a decline of approximately 2.2 million males and 2.15 females in the 18 to 24 age group during the 1980's.-You younger gentlemen might be interested in trying to buck that trend, but seriously, if this downward trend is realized, and continues past the year 1990, it could pose a serious challenge to the success of any Volunteer Force in the long term.

The Navy is already over-extended in its specification of skill requirements to operate and maintain weapons and their support systems. It is unrelaistic to think that this trend can continue much longer, regardless of the quality of the manpower pool, without inviting a serious breakdown of the personnel/manpower system. Under the best possible conditions, there is the imminent danger that there soon will be more specialized billets than there are trainable people to fill them.

In assessing the impact of the AVF on the Navy, the composition of the Navy for the past ten years has been examined and a five year projection was made. The mental level, educational background and age of our sailors do not depart radically from past and present levels. However, levels of ability to read and comprehend have declined, and are expected to decline further, continuing a downward trend since 1964.

These projections should significantly influence and constrain the basic philosophies of weapon system performance and design as well as the management of enlisted manpower. The trend toward sophisitcation of weapon systems and components must be counter-balanced by a comparable easing of required skills for maintenance and repair. By a dedicated program to increase the mean time between maintenance actions that is required on equipments and by simplifying maintenance procedures, the man-hours and number of personnel required to maintain these equipments can be reduced, and personnel of lower mental accuity utilized. Further utilization of these resources can be realized by increasing the mean time between failure of equipments and facilitating the isolation and identification of each failure by such innovations as 'built-in' self-diagnostic capabilities and modular replacement.

Relatively few of the plans for development and introduction of systems now being installed in the fleet adequately address the skill requirements for operations, maintenance and particularly repair. However, plans recently formulated indicate that the following trends may be starting:

FIRST, throughout our Naval Material Command, requirements are now being levied that systmes be designed for easier maintenance, diagnosis and repair. Mean time between failure is to be increase and use of fault-locacting circuits, 'built-in' test equipment and modular replacement is to be maximized. If these innovations become reality-and they must-a less demanding level of skill may be employed to operate and service the systems, with training costs reduced accordingly.
SECOND, while individual components of a system are being designed for easier serviceability, there is a trend toward interfacing them into centralized and computerized control systems. A relatively few highly skilled Systems Technicians, who understand both the operation of all components and their interrelationships, will be required to operate the system and oversee the work of technicians who will be responsible for its components. Casualties will be isoled by these system technicians, and the component technicians will conduct further diagnosis and effect repairs. These System Technicians will require a higher level of training than do technicians who presently operate, maintain and repair equipments. However, the number of billets requiring these highly skilled technicians should be significantly less than those billets the presently require senior technicians.

In some technological areas, most notably the gas turbine propulsion system and the DLG combat systems, the requirement for this type of systems trained technician is definitely emerging. Compared to the current engineering ratings, the gas turbine requirements encompass more knowledge areas than does any single rating. The combat systems technician is developing because of a maintenance requirement that must be met over a broad spectrum of sub-components. The DLG(N) 38 and DD 963 Class ships are equipped with a central computer complex which controls the operations of the individual ship's sensors, fire control subsystems, and weapon launching equipment. To operate and maintain this system properly, senior personnel must be trained in the theory, operation and maintenance of the entire combat system and not just the sub-systems peculiar to their own rating. This combat system technician would be trained from the most able personnel in the ratings whose equipment is associated with, or controlled by, the central computer.

Development of the SSN 688 and TRIDENT Class submarines also has resulted in a requirement for a systems technician akin to the combat system technician on surface ships. The limitations on the size of the ship, however, constrain the number of maintenance oriented billets. The result is a requirement for an even larger proportion of highly skilled technicians to sub-system component ratings than is the case in surface ships. In each of the ships cited the number of systems technicians must be minimized if we are to maintain them with the manpower available.

THIRD, equipment design techniques must be controlled, and a concerted effort made to revise technical publications for eariser use and more thorough comprehension. New systems and equipments must be designed to facilitate maintenance and repair by the average bluejacket. This principle has been clearly enunciated and is being implemented by our Chief of Naval Material. The watchword to the technical manual writers is: 'TAKE TIME TO MAKE IT SIMPLE.'

Additionally, study of the Navy Enlisted Occupational Classification System has recently been completed. The Study Group's plan for redesigning the enlisted occupational classification system is attuned to the reality that there are limitations to the current and future supply of talented people to man the Navy.

The plan's philosophy recognizes the changing quality of the men and women expected to pursue naval careers in an All Volunteer Force, and relates the supply to the projected future demands of weapons technology for skills. The NEOCS Plan assumes that these future weapons systems will be designed so as to consider the operator and maintainer and to integrate training and personnel management into each system.

Now, what about the ships in the Fleet today? Although the average age of the Fleet is decreasing-from almost 18 years in 1969 (926 ships) to 13.4 years (511 ships) this year-we still have a large number of general purpose ships manned to perform all their functions simultaneously. And many of us still think in these terms-a ship should be able to carry out simultaneously coordinated air, surface and ASW attacks while steaming at flank speed in a Task Group.

Unfortunately, even in our older ships, this is no longer the case. Ship systems have been modernized and are no longer the simple, independent equipments they once were. As we learn more about our systems and equipments we impose more extensive operating and maintenance requirements through modernization. These, and other factors have had a significant impact both on our current forces and those ships that we are designing and building.

In an effort to keep abreast of modern technology as it increases the complexity and scope of naval warfare, as well as to improve the performance of older equipment, we have institute several maintenance and tracking programs either in addition to, or as adjuncts of, the Ships' Maintenance and Material Management System, case '3-M'. Performance tests have been devised for a number of equipments using vibration, sound, oil, and pressure analyses to evaluate the condition of the equipment without having to resort to the more time-consuming 'open and inspect' methods. These methods save wear and tear on the equipments, and, more importantly, save precious time for our maintenance and repair technicians. On the system level, we recognized that our '3-M System" did not provide the ship with the capability of verifying that performance of ship systems would enable the ship to carry out its assigned mission. We developed a Total Ship Test Program concept as an adjunct to '3-M'. It divides the total spectrum of ship system tests into Combat, Combat Support, Mobility and Containment Systems with the goal of obtaining the most efficient use of our maintenance assets.

About four years ago, the Naval Ship Systems Command was assigned the responsibility for evaluating Fleet equipment relaibility data and for developing a coordinated management progrm for improving Fleet support. If the Fleet's most serious equipment problems were continually changing from year to year, we could assume that problems were being corrected as they became known. However, NAVSHIPS found that the Fleet's most serious problem equipments have not basically changed for the past five or more years. Why then, have these problems not been corrected? Technicial complexity is, of course, one part of the answer; but this is only part. The other part of the answer includes changing priorities, lack of funds, disagreement as to just what is the problem, and most importantly, the lack of qualified goals for acceptable performance. For years and years, we have reacted to the 'squeaky wheel' principle in an honest attempt to be responsibe to the Fleet's needs and complaints.

The DART Program-Detection, Action and Response Technique- was established with the Naval Material Command for just that purpose of identidication and correction of the most serious shipboard equipment problems affecting the Fleet's material readiness. DART tracks the 16 most serious material problems plaguing the Fleet today, picked from a list of nominees and ranked based on the Material Condition Index from the Consolidated CASREPT Reporting System, '3-M' data and SYSCOM and Fleet recommendations.

DART has helped us identify and correct some of our most serious problems. But if it is to assist in the longer range solution, we must these data to determine why these equipments became material problems. We must answer the question: 'How could they have been designed and built to provide better reliability and easier maintainability with a realistic acknowledgement of the skill levels of the sailors who would be operating and maintaining them?' The problem is and has been serious, even with older, less complicated equipment, and with ship's manning that provides for maintenance. The answers we get will insure that much more reliability is in our future ships.

Although we still have multi-purpose ships in the Fleet, our newer ships are designed to fulfill more specialized missions. Because of this, and as a result of automation and other new developments, we have been able to reduce singificantly the numbers of sailors required to man these new ships.

It is no secret that manpower costs under the AVF are as important a factor as modern technology in their impact both on the modernization of our current forces and on new design. Even though the Navy is heavily materiel oriented, personel costs consume over half of our budget and are increasing every year. We have a very real interest, from a dollars and cents standpoint, in how well automation and other manpower-saving programs work while still maintaining the combat effectiveness of the Fleet.

If we are to increase the effectiveness of our manpower, we must first understand the problem. It is within the state-of-the-art today to provide almost any degree of automation or system inegration. Too often, the engineer gets carried away with designing the most complex system possible, when a simpler solution would suffice. In this regard, I am reminded of the many wonderful inventions of the late Rube Goldberg. As with his inventions, the complex approach leads to more problems than it solves. Complexity often breed unreliability, raises the skill requirements for both operator and maintainer to unrealistic

and unattainable levels, and requires more personnel to process the information gained and to keep the system working. In the immediate past, we have tended to 'complex ourselves out of business.'

On the other hand, if, in designing a ship or weapons system, we consciously look for the most effective way to do the job under 'Design to Cost' rules and consider manpower appropriately in that cost, we can come up with equipments and systems which will adequately and effectively fulfill the mission with lesser requirements for both numbers and skill levels of personnel.

The Patrol Frigate Program is a good example of the effort, in which reduction of personnel was used as primary factor in the design equation. In this ship state-of-the-art systmes have been chosen which are reliable, maintainable and require fewer people to operate. New maintenance concepts are being introduced, many based upon, or similar to, aircraft maintenance philosophies; such as modular replacement of components based upon performance or condition testing and analysis, automated test equipment, new materials, and others.

There is much more that can and must be done in this area if we are truly going to provide a means to retain mission capability with reduced manning for both operations and maintenance. We need simple, reliable weapons and engineering systems; better materials and coatings to improve both reliability and maintainability; and more refinements in preventive maintenance procedures along the lines of those previously mentioned. We need a maintenance philosophy and firm maintenance strategy for these new ships that will provide means of failure prediction and a determination of optimum repair and overhaul frequencies. We need more information and data of the effectiveness and economies of shore based maintenance as opposed to 'on board' maintenance. Is it really a viable, economical philosophy? How much automation and integration is enough but not too much? Which systems and equipments must have a manual means of operation as a backup, and how much redundancy must we have in case of battle damage?

These last two points in particular give me cause for concern. The old poem about the blacksmith--'...for want of a nail...'--becomes magnified many times in an automated, computerized ship that has no backup manual capability and no other means to fight except its automated systems. In our efforts to save manpower and money, we must not forfeit the capability of fighting the ship. Replacing log keepers and messengers, or navigating by satellite is one thing making the entire capability of a warship totally dependent on one vital part is quite another.

People are our most important asset, and the key to our readiness posture. Their proper utilization through intelligent use of shipboard automation, systems integration and good design which eliminates unnecessary tasks and equipments is our greatest challenge in today's Navy under the AVF. We must keep this challenge foremost in our minds as we attack the problems of today and design the ships of tomorrow."

THE NAVAL SEA CADET CORPS NEEDS LEADERSHIP

The Naval Sea Cadet Corps is a mationwide youth program sponsored by the Navy League of the United States and supported by the Department of the Navy. The objectives of the NSCC are:

a. To develop in young men an interest and skill in seamanship and sea going disciplines;

b. To instill in Cadets an appreciation for our Navy's history, customs, traditions and the significance of a modern Navy on the Department of Defense team;

c. To build in every cadet a sense of patriotism, courage, self-reliance, and confidence; those qualities which will mold good character and citizenship.

d. To raise the prestige of a military career and increase the advancement potential of Cadets who may later elect to serve with the Navy, Marine Corps or Coast Guard.

The Naval Sea Cadet Corps depends upon volunteers from among active duty and retired personnel for leadership. Currently positions are open with the Monterey County Division of the Naval Sea Cadet Corps for officers who like to work with youths. In addition, the unit is presently trying to expand its program to include young ladies who might be inclined in a service career, but needs a woman volunteer who would work with the distaff side.

If you are interest in becoming a volunteer in this worthwhile program, or are interested in more information for yourself or your son or daughter contact LCDR Tom Forbes, SMC 2867 or LCDR Bob Finley SMC 1590.